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(57) Abstract

Problem

To improve the sensation of use and operability in the reproduction of audio files.

Means to solve

The reproduction sequence for multiple audio files stored on an HDD is managed based on list information, which manages reproduction sequence information. This list information is created for each of multiple classification items. In addition, a structure is utilized whereby the reproduction of audio files is managed such that when an audio file is being reproduced and output according to the reproduction sequence managed by the list information, this audio file continues to be reproduced even when the setting for the classification item is switched in response to a user operation.

Selected Figure: Figure 4

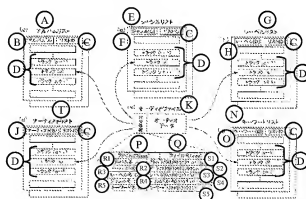


Figure 4

Key: A Album list
B Album (A)
C List ID
D Track ___
E Genre list
F Genre (C')
G Label list

H	Label (D)
I	Artist list
J	Artist (B)
K	Audio file
L	Additional information
M	Audio data
N	Keyword list
O	Keyword (E)
P	File ID
Q	File name
R1	Album name
R2	Artist name
R3	Label name
R4	Genre name
R5	Keyword name
S1	Track numbers in album list
S2	Track numbers in artist list
S3	Track numbers in label list
S4	Track numbers in genre list
S5	Track numbers in keyword list

Claims

1. An information output device characterized in that it is equipped with a reproduction sequence management means that, based on reproduction sequence information, manages the reproduction sequence of multiple units of information stored in a storage medium, and that is capable of managing the reproduction sequence based on, as the aforementioned reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item;

a classification item setting means that sets the aforementioned classification item in response to an operation;

an information output means that is capable of performing a prescribed information output that is based on the aforementioned units of information and that corresponds to the reproduction sequence information of the classification item that has been set with the aforementioned classification item setting means;

and a control means that, when information based on one of the aforementioned units of information is being output by the aforementioned information output means and the classification item setting is changed from the aforementioned first classification item to the aforementioned second classification item by the aforementioned classification item setting means, performs control such that the aforementioned unit of information that is the basis of the information being output by the aforementioned information output means at this time is maintained.

2. The information output device recorded in Claim 1, characterized in that as the information output mode, the aforementioned information output means is capable of reproducing/outputting by sequentially switching the units of information stored in the aforementioned storage medium, [said switching being] based on reproduction sequence information that, of the reproduction sequence information managed by the aforementioned reproduction sequence management means, is [reproduction sequence management information] that is in accordance with the classification item that has been set with the aforementioned classification item setting means;

and when the switching of the units of information reproduced/output by the aforementioned information output means is performed,

the aforementioned control means confirms – as the unit of information that should be reproduced after the switching – the next unit of information that should be reproduced following the unit of information [that was being reproduced] prior to the switching, [this selection being] based on referencing the reproduction sequence information in accordance with the classification item that has been set by the aforementioned classification item setting means at this time.

3. The information output device recorded in Claim 1, characterized in that based on the reproduction sequence information that is based on the aforementioned classification item, the aforementioned information output means is capable of displaying and outputting the units of information stored in the aforementioned storage medium, including the aforementioned one unit of information, [said display being] according to the reproduction sequence and in a prescribed display format that can be visually recognized;

and the aforementioned control means is constructed such that

when the classification item setting is changed from the aforementioned first classification item to the aforementioned second classification item by the aforementioned classification item setting means, the display of the aforementioned one unit of information is maintained, and only the display of the other units of information is changed based on a reproduction sequence that is based on the aforementioned second classification item.

4. An information output method characterized in that it includes

a reproduction sequence management step wherein the reproduction sequence of multiple units of information stored in a storage medium is managed based on reproduction sequence information, and the reproduction sequence can be managed based on, as the aforementioned reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item;

a classification item setting step wherein the aforementioned classification item is set in response to an operation;

an information output step wherein a prescribed information output, which is based on the aforementioned units of information and corresponds to the reproduction sequence information of the classification item that has been set with the aforementioned classification item setting step, can be performed;

and a control step wherein, when information based on one of the aforementioned units of information is being output by the aforementioned information output step and the classification item setting is changed from the aforementioned first classification item to the aforementioned second classification item by the aforementioned classification item setting step, control is performed such that the aforementioned unit of information that is the basis of the information being output by the aforementioned information output step at this time is maintained.

5. A program characterized in that it causes an information output device to execute:

a reproduction sequence management step wherein the reproduction sequence of multiple units of information stored in a storage medium is managed based on reproduction sequence information, and the reproduction sequence can be managed based on, as the aforementioned reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item;

a classification item setting step wherein the aforementioned classification item is set in response to an operation;

an information output step wherein a prescribed information output, which is based on the aforementioned units of information and corresponds to the reproduction sequence information of the classification item that has been set with the aforementioned classification item setting step, can be performed;

and a control step wherein, when information based on one of the aforementioned units of information is being output by the aforementioned information output step and the classification item setting is changed from the aforementioned first classification item to the aforementioned second classification item by the aforementioned classification item setting step, control is performed such that the aforementioned unit of information that is the basis of the information being output by the aforementioned information output step at this time is maintained.

6. A recording medium characterized in that it records a program that causes an information output device to execute

a reproduction sequence management step wherein the reproduction sequence of multiple units of information stored in a storage medium is managed based on reproduction sequence information, and the reproduction sequence can be managed based on, as the aforementioned

reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item;

a classification item setting step wherein the aforementioned classification item is set in response to an operation;

an information output step wherein a prescribed information output, which is based on the aforementioned units of information and corresponds to the reproduction sequence information of the classification item that has been set with the aforementioned classification item setting step, can be performed;

and a control step wherein, when information based on one of the aforementioned units of information is being output by the aforementioned information output step and the classification item setting is changed from the aforementioned first classification item to the aforementioned second classification item by the aforementioned classification item setting step, control is performed such that the aforementioned unit of information that is the basis of the information being output by the aforementioned information output step at this time is maintained.

Detailed explanation of the invention

[0001]

Industrial application field

The present invention pertains, for example, to an information output device and to the output method thereof, whereby any information can be output, [said information being] based on units of information stored on a storage medium. Furthermore, the present invention pertains to a program and a storage medium on which this program is stored, which are for the purpose of implementing an information output device and information output method of this type.

[0002]

Prior art

In recent years inexpensive, high-capacity hard disks (HDD) have become common. Furthermore, the compression and recording of audio data by methods such as ATRAC (Adaptive Transform Acoustic Coding) and MP3 (MPEG Audio Layer III) have become common.

In addition, in response thereto, ripping – whereby audio data recorded on a CD (Compact Disk) are compressed and saved by recording to hard disk – has become common. This ripping is performed by means of a personal computer, for example. Furthermore, by

providing audio devices constructed with a disk drive capable of reproducing CDs and with an HDD, for example, this ripping also can be performed with an audio device of this type.

[0003]

For example, if the audio data for several musical pieces or the like are stored on a hard disk by means of this ripping, a user can be freed from the bother of having to sequentially exchange and then play the CDs of the albums to which he wants to listen, and an enhanced environment for listening to musical pieces can be obtained.

[0004]

Furthermore, with applications that manage and reproduce audio data files (hereinafter also referred to as "audio files") that have been recorded on an HDD by ripping, typically the audio files can be managed and reproduced according to multiple classification items.

[0005]

Figure 11 shows an overview of an example of audio file management by means of multiple classification items of this type.

When an HDD on which audio files are recorded is considered to be the root, the audio files recorded on this HDD are separated according to each classification item, for example, first by album, artist..., etc. In addition, for example, [the files] are separated album-by-album into groups under the classification item "album," as album A, album B,... . On that basis, groups of audio files are managed so as to correspond to and belong to each album. Here, the concept of an "album" corresponds to the content recorded on a CD as an album.

Furthermore, the audio file group that is included for each album is managed such that the reproduction sequence corresponds to that album content.

[0006]

Similarly, [the audio files] are separated artist-by-artist into groups under the classification item "artist," as artist, A, B,..., and the groups of audio files are managed so as to correspond to and belong to each artist. Furthermore, within the group for each artist, the reproduction sequence is set and managed according to a prescribe rule, such as a reproduction sequence set by the user, the ripping sequence, or the alphabetic order or the hiragana syllable order of the song titles.

[0007]

Then, when the user plays an audio file recorded on the HDD, the user is able to select and play an audio file group according to the desired classification item. For example, if the user wants to play the audio file group for album A, the user performs the reproduction operation by first selecting the "album" classification item, and then selecting the album A group from the albums under the classification item "album."

Similarly, when the user wants to listen to all of the audio files for artist B, the user performs the reproduction operation by selecting the "artist" classification item and then selecting the artist B group.

[0008]

Thus, the user is able to select and play any group of audio files grouped according to a classification item. In other words, as shown in Figure 11, for example, audio file C belongs to album A in the album classification and belongs to artist B in the artist classification. With respect to the playing of this audio file C, the user can, according to his preference, listen to [said file] as one musical piece belonging to album A, or as one musical piece performed by artist B.

[0009]

Problems to be solved by the invention

However, with the conventional construction whereby an audio file is reproduced by the aforementioned procedure with the audio file management as described using Figure 11, the following inconvenience occurs.

[0010]

Here, for example, assume that the user has selected the album A group and currently is playing audio file C. Then, in this state, the user wants to play the same audio file C from the artist B group, to which this audio file C also belongs, and then wants to continue listening to the remaining musical pieces (audio files) of artist B.

[0011]

In this case, according to the operating procedure explained with the aforementioned Figure 11, the user first performs a prescribed operation and returns to the level at which album groups (album A, B, etc.) are selected, and then the user returns to the root at which classification items (album, artist, etc.) can be selected. Then, after making a new selection of artist as the classification item at this root level, artist B is selected from the group of artists.

Then, the operation to play audio file C from the group of audio files presented as belonging to artist B is performed.

[0012]

With the management of audio files as explained with Figure 11, even if the same audio file belongs to some groups classified by different classification items, the content of the audio files that form each group differs. Accordingly, the reproduction order differs for the audio file itself, as well as for the audio file that should be played following that audio file.

This is assumed with the aforementioned operating procedure. In other words, when the group (the classification item) is changed, even though the same audio file is being reproduced, the reproduction of the file begins anew based on the reproduction sequence of the newly selected group. as if the reproduction sequence of the group [that had been selected] prior to the change has been cleared.

[0013]

However, as described above when the classification item and group are reselected and the operation to select and play audio file C is performed, the audio file C – which at this point already has been partially reproduced and output – is stopped, and reproduction begins again from the beginning. In other words, even though the same audio file is being played, it is not possible to continue playing that audio file when the classification item is changed. Therefore, for example, the user experiences the discomfort and bother of having to listen to a portion [of the music] that the user already has heard.

Furthermore, with the aforementioned operation, for example, the operation – which involves returning to the root [level] from the group to which audio file C, which has been playing up to this point, belongs, and then selecting the desired classification item → group → audio file – is performed sequentially. In other words, the operation involves many steps that can be said to be inconvenient for the user.

Thus, based on the combination of the current audio file management [method] and the operating procedure, it can be said that there still is room for improvement in terms of convenience and ease of use with respect to the reproduction of audio files.

[0014]

Means to solve the problems

Accordingly, in light of the aforementioned problem, the present invention – as an information output device – is provided with the following configuration.

In other words, it is equipped with a reproduction sequence management means that, based on reproduction sequence information, manages the reproduction sequence of multiple units of information stored in a storage medium, and that is capable of managing the reproduction sequence based on, as the reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item; a classification item setting means that sets the classification item in response to an operation; an information output means that is capable of performing a prescribed information output that is based on the units of information and that corresponds to the reproduction sequence information of the classification item that has been set with the classification item setting means; and a control means that, when information based on one of the units of information is being output by this information output means and the classification item setting is changed from the first classification item to the second classification item by the classification item setting means, performs control such that the unit of information that is the basis of the information being output by the information output means at this time is maintained.

[0015]

Furthermore, as an information output method, [the present invention] is configured as follows.

In other words, it is configured so as to include a reproduction sequence management step wherein the reproduction sequence of multiple units of information stored in a storage medium is managed based on reproduction sequence information, and the reproduction sequence can be managed based on, as the aforementioned reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item; a classification item setting step wherein the classification item is set in response to an operation; an information output step wherein a prescribed information output, which is based on the units of information and corresponds to the reproduction sequence information of the classification item that has been set with the classification item setting step, can be performed; and a control step wherein, when information based on one of the units of information is being output by this information output step and the classification item setting is changed from the first classification item to the second classification item by the classification item setting step, control is performed such that the unit of information that is the basis of the information being output by the information output step at this time is maintained.

[0016]

Furthermore, as a program, [the present invention] is configured as follows.

In other words, it is configured such that it causes an information output device to execute a reproduction sequence management step wherein the reproduction sequence of multiple units of information stored in a storage medium is managed based on reproduction sequence information, and the reproduction sequence can be managed based on, as the aforementioned reproduction sequence information, at least first reproduction sequence information that is based on a first classification item and second reproduction sequence information that is based on a second classification item; a classification item setting step wherein the classification item is set in response to an operation; an information output step wherein a prescribed information output, which is based on the units of information and corresponds to the reproduction sequence information of the classification item that has been set with the classification item setting step, can be performed; and a control step wherein, when information based on one of the units of information is being output by this information output step and the classification item setting is changed from the first classification item to the second classification item by the classification item setting step, control is performed such that the unit of information that is the basis of the information being output by the information output step at this time is maintained.

[0017]

Furthermore, the storage medium [of the present invention] is constructed by storing the aforementioned program.

[0018]

By means of the various aforementioned configurations, the reproduction sequences for units of information stored on a storage medium are managed differently for each classification item selected in response to a user operation. Furthermore, any [type of] output of information (a reproduction output, a display output, and the like) can be performed according to reproduction sequence information that is based on a unit of information.

In addition, even if the setting for the classification item is changed when the aforementioned information output is being performed, the unit of information on which the information output at this time is based is maintained, and is not changed in response to the changing of the classification item.

In summary, this means that when a unit of information that belongs to multiple classification items exists, the output of information is performed in response to a change in the classification item with this shared unit of information as the axis [sic]. Furthermore, the

aforementioned information output means outputs information according to the reproduction sequence, so even if the reproduction sequence of a unit of information is changed in response to a change in the classification item, the output of the information that is based on the aforementioned shared unit of information will be maintained in the changed reproduction sequence.

[0019]

Embodiment of the invention

In the following an embodiment of the present invention will explained. The explanation will be in the following order.

1. Structure of the recording/reproduction device
2. Basic form of management of an audio file of the present embodiment
3. Classification item switching operation
4. Program structure
5. Management of audio file reproduction (first example)
 - 5-1. Data structure
 - 5-2. Processing operation
6. Management of audio file reproduction (second example)
 - 6-1. Data structure
 - 6-2. Processing operation
7. Management of audio file reproduction (third example)

[0020]

1. Structure of the recording/reproduction device

Figure 1 is a block diagram showing an example of the structure of the recording/reproduction device of the present embodiment. A CPU (Central Processing Unit) 11 controls the entire recording/reproduction device 1 based on a program that is started, and performs calculations. For example, it performs communication operations via a network, input/output operations with respect to the user, CD reproduction and ripping, storage of content on an HDD 21, and the management thereof.

CPU 11 exchanges control signals and data with each circuit via a bus 12.

[0021]

A memory 13 comprehensively represents a RAM, ROM, flash memory (nonvolatile memory), and the like used by CPU 11 for processing.

The ROM in memory 13 stores an operating program executed by CPU 11, a program loader, and the like. Furthermore, the flash memory in memory 13 stores various computational coefficients, parameters used by the programs, and the like. The RAM of memory 13 temporarily holds data areas and task areas during execution of programs.

[0022]

Operation input unit 15 is a component that is comprised of various manipulation elements such as an operation key and a jog dial, a touch panel, and the like, which are provided on the chassis of recording/reproduction device 1. In addition, a keyboard and mouse can be provided as operation input unit 15 for the purpose of GUI (Graphical User Interface) operations.

Information that is input with operation input unit 15 undergoes prescribed processing by an input processing unit 14, and operating commands are transmitted to CPU 11. CPU 11 performs required computations and controls such that operation [of the recording/reproduction device] in response to the input operating commands can be obtained.

[0023]

A display device such as a liquid crystal display is connected as a display monitor 17, and displays a variety of information.

When CPU 11 supplies display information to a display processing unit 16 according to various operational states, input states, and communication states, display processing unit 16 executes a display operation with respect to display monitor 17 based on the supplied display data.

For example, with the present embodiment, a GUI screen is displayed for the purpose of managing and playing audio files in response to a program that reproduces/manages ripped audio files.

[0024]

CD drive 19 is equipped with an optical head, spindle motor, reproduction signal processing unit, servo circuit, and the like, and performs CD reproduction operations. A CD drive control unit 18 controls CD reproduction operations, access operations, and the like performed by CD drive 19. For example, when the user performs a CD reproduction operation from [operation] input unit 15, CPU 11 instructs CD drive control unit 18 to play the CD. Consequently, CD drive control unit 18 performs control so as to cause CD drive 19 to play/access [the CD].

CD drive 19 decodes signals read from the CD, and transmits reproduction data to bus 12 via CD drive control unit 18.

At audio data processing unit 24, these reproduction data undergo acoustic processes such as equalizing, and processes such as volume adjustment, D/A conversion, and amplification, and [the resulting signal] is output to a speaker unit 25.

[0025]

Furthermore, the data reproduced by CD drive 19 can be processed by CPU 11 with a prescribed file-encoding process and stored in HDD 21 as an audio file. In other words, the obtained audio file can be stored by means of ripping.

As for the format of this audio file, it can be 16-bit quantized digital audio data with a sampling frequency of 44.1 KHz in CD format, or it can be compressed audio data which have been compressed by a prescribed method to conserve capacity on HDD 21. Furthermore, although the compression method is not limited to these, an ATRAC (Adaptive Transform Acoustic Coding) method or an MP3 (MPEG Audio Layer III) method can be used.

[0026]

Furthermore, as is publicly known, management information called "TOC" is recorded on the innermost circumferential side of the CD, and when the CD is reproduced, the tracks (content) on the disk are accessed based on the TOC. Accordingly, when a CD is installed, CD drive control unit 18 instructs CD drive 19 to read the TOC and thus obtains the TOC data that have been read, enabling control of the reproduction of the CD.

[0027]

A tuner unit 27 is an AM/FM radio tuner, for example, and under the control of CPU 11, it demodulates broadcast signals received by an antenna 26. Naturally, the tuner also can be a television tuner or a satellite broadcast tuner, a digital broadcast tuner, or the like.

The demodulated broadcast audio signal undergoes prescribed processing in audio data processing unit 24 and is output from speaker unit 25 as an audio broadcast.

[0028]

Based on control from CPU 11, a communications processing unit 22 performs an encoding process on transmission data and a decoding process on reception data.

A network interface 23 transmits the transmission data that have been encoded by communications processing unit 22 to a prescribed external network-compatible device via the network. In addition, signals transmitted from the external network-compatible device via the network are received by communications processing unit 22, and communications processing unit 22 transmits the received information to CPU 11.

[0029]

Furthermore, the structure of recording/reproduction device 1 is not limited to the structure in Figure 1; a variety of other [structures] are conceivable.

For example, a DVD (Digital Versatile Disc) drive, MD (Mini Disc) drive, tape drive, or the like can be provided to handle various recording media, and an interface with a peripheral device based on a USB (Universal Serial Bus), IEEE1394, Bluetooth or the like communication method can be provided.

Furthermore, terminals used for a microphone or external headphones, or a video output terminal, line connection terminal, and optical digital connection terminal and the like for use when a DVD is reproduced can be connected.

Furthermore, a PCMCIA slot, memory card slot, and the like can be formed [sic] and data can be exchanged with an external information processing device or audio device.

[0030]

2. Basic form of management of an audio file of the present embodiment

Next, the basic form of management of the audio files stored in HDD 21 will be discussed.

The management of the audio files in the present embodiment can be identical to what was shown previously in Figure 11. With the present embodiment, by adopting a reproduction management structure – to be explained later – that is based on a management form of this type, audio files can be reproduced with better operability and comfort than with the prior art.

[0031]

In summary, to say that [the form of management used] is the form of management shown in Figure 11 means that, as shown in the figure, an HDD on which audio files are stored is considered to be the root, and below this root [the audio files] are divided so as to be partitioned based on each classification item.

In Figure 11 at least [sic; only] the two classification items "album" and "artist" are shown, but with the present embodiment the classification items "genre," "label," and "keyword" are used in addition to "album" and "artist," as will be explained later. In other words, five classification items are set with the present embodiment. Naturally, more classification items can be set.

[0032]

Furthermore, for example, under the classification item "album," [the audio files] are divided into groups for each album, as album A, album B,... On that basis, groups of audio files are managed so as to correspond to and belong to each album. Here, the concept of an "album" corresponds to the content recorded on a CD as an album. Furthermore, as a principle, the audio file group that is included for each album is managed such that the reproduction sequence corresponds to that album content. In addition, the user can subsequently change the settings according to his preference, for example.

[0033]

Similarly, [the audio files] are separated artist-by-artist into groups under the classification item "artist," as artist, A, B,..., and the groups of audio files are managed so as to correspond to and belong to each artist. Furthermore, in this case as well, within the group for each artist, the reproduction sequence is set and managed according to a prescribed rule, such as a reproduction sequence set by the user, the ripping sequence, or the alphabetic order or the hiragana syllable order of the song titles.

Furthermore, although not shown in this figure, under each of the remaining classification items "genre," "label," and "keyword," [the audio files] are separated into groups for genres, labels, and keywords, and the groups of audio files are managed so as to correspond to and belong to each group.

[0034]

3. Classification item switching operation

With recording/reproduction device 1 of the present embodiment previously shown in Figure 1, the audio files store in HDD 21 can be reproduced and output as, for example, audio. Furthermore, execution of the basic management [process] shown in the aforementioned Figure 11 means that when one given audio file is reproduced, that audio file is handled as a file belonging in one group list under the currently selected classification item. In other words, when the user plays an audio file, first it is necessary to specify the classification item to which the group [of files] to be played belongs.

[0035]

Next, an example of the operation for switching the classification item when an audio file is being reproduced with the present embodiment will be explained with reference to Figure 3. In particular, the present embodiment is characterized by the user interface [used] when one given audio file is reproduced and output, for example, so this point will be explained.

[0036]

Figure 2 shows the display screen of display monitor 17; it shows an example of the display status of the GUI (Graphical User Interface) for the purpose of selecting a group.

Here, for example, currently a specific group in the classification item album has been selected, and the audio file that is managed as the sixth musical piece in the reproduction sequence for this group is being reproduced.

As shown in Figure 2(a), in accordance with this [selection], an album list image A1 is displayed on the display screen of display monitor 17. Currently the audio files belonging to the group for the album that has been selected for reproduction are displayed as a playlist in this album list image A1.

[0037]

As shown in the figure, first, a title area A11 is arranged in a region at the top inside the image frame of this album list image A1. The title of that group is displayed therein as text to enable the user to recognize that group. In this case it is an album group, so the album title is displayed.

Beneath the title area, a track list area A12 is arranged. Numbers are displayed in this track list area A12 as track numbers corresponding to the reproduction sequence, in descending order from the first musical piece. In addition, the file names of the audio files (the titles of the musical pieces) that correspond to each track number are displayed.

Furthermore, as described previously, in this case the sixth musical piece in this group displayed as an album list is being reproduced and output. In accordance therewith, the line for track number 6 is displayed with emphasis as the reproduction file specification display A13 in track list area A12, as shown in the figure. Thus, the user is able to recognize visually that the group for the album displayed in Figure 2(a) is the reproduction target, and that currently the sixth musical piece in this group is being reproduced.

[0038]

Next, assume that in this situation the user wants to change the classification item – for the group to which the audio file currently being played belongs – to [a classification item] other than that of this album.

In this case, this operation to change the classification item is a toggle operation using one specific manipulation element (or a button that is displayed on the screen for the purpose of changing the classification item). In other words, the classification items are changed one at a time each time the manipulation element is manipulated. With the present embodiment, as

described previously, there are five classification items: "album," "artist," "genre," "label," and "keyword," so each time the manipulation element is manipulated, the classification item is switched among these. In addition, this switching among the classification items occurs cyclically.

Furthermore, naturally the operation to change the classification item is not limited to the aforementioned toggle operation. For example, the desired classification item can be specified directly by operating a button on the GUI screen or manipulation elements that are assigned in advance to the classification items on a one-to-one basis.

[0039]

Then, when the user has performed the operation to change the classification once in the situation shown in Figure 2(a), the list image for the classification item is switched, for example [to the image] shown in Figure 2(b). In this case, it is switched from "album" to the next classification item, "artist," and accordingly the artist image A2 is displayed as in Figure 2(b).

For example, groups [of files] for multiple artists have been created under the "artist" classification item, but in this case the artist list image A2, which corresponds to the group [of files] for the artist that includes the audio file currently being reproduced, is automatically selected from these groups for multiple artists, and [this list image] is displayed.

The content displayed with this artist list image A2 also includes the name of the artist, which is displayed in title area A11, and the file names for the audio files belonging to that group (the titles of the musical pieces), which are displayed according to their track number (reproduction sequence) in track list area A12. In this case as well, the line in track list area A12 for the audio file currently being reproduced is displayed with emphasis as reproduction file specification display A13. In this case, it can be seen that the audio file for track number 13 (the 13th musical piece) in this group is being reproduced.

[0040]

With the present application example, when the operation to switch the classification item is performed, the audio file currently being reproduced continues to be reproduced, as long as it is not stopped by the user and as long as an operation to change the file being reproduced is not performed. Accordingly, as shown in the figure, track number 6 in Figure 2(a), which is displayed [so as to indicate that it is] currently being reproduced, and track number 13 in Figure 2(b), which is displayed [so as to indicate that it is] currently being reproduced, are [shown to be] the same audio file, based on reproduction file specification display A13.

Then, in the state shown in Figure 2(b), when the user for example performs an operation to set the classification item, the group for the artist list shown in Figure 2(b) is set as the classification item that is targeted for reproduction.

In this case, however, reproduction does not start over from track number 1 of the artist list after the switch occurs; the audio file that has been reproduced up to this point continues to be reproduced without interruption. However, after the switch occurs, this audio file is not handled as if it belongs to the album list group shown in Figure 2(a); instead, it is handled as if it belongs to the artist list group shown in 2(b), which has been set as the new reproduction target. Accordingly, when reproduction of this audio file is completed, the next audio file to be reproduced will be the audio file for track number 14 (the 14th musical piece) in the artist list shown in Figure 2(b).

[0041]

Next, for example, assume that the setting operation is not performed when the artist list image A2 shown in Figure 2(b) is displayed, and the operation to switch the classification item is again performed. In this case, for example, as shown by the movement (c) → (d) → (e) in Figure 2, the display switches sequentially to the label list image A3 → genre list image A4 → keyword list image A5.

The content displayed with label list image A3, genre list image A4, and keyword list image A5 is in accordance with each of the list images shown in Figures 2(a) and (b). In other words, the label name, genre, [or] keyword is displayed in title area A11, so it is possible to recognize visually which group it is. Furthermore, the file names of the audio files (the title of the musical pieces) corresponding to the track numbers (the reproduction sequence) are displayed in track list area A12. Moreover, in the same manner [as described previously], the audio file currently being reproduced is indicated by reproduction file specification display A13.

[0042]

Thus, as the GUI for the purpose of selecting the classification item with the present embodiment, the list images for groups [of files], the display of which is switched in response to switching of the classification item, always includes the audio file that is currently being reproduced.

In other words, a list image is displayed as the output of the information based on audio files (units of information) stored in HDD 21, and tracks belonging in that list (belonging to the group under that classification item) are displayed in their reproduction sequence. On that basis, the emphasized display by means of reproduction file specification display A13 continues for the audio file currently being reproduced, even when the list image is switched.

[0043]

Furthermore, when the selected classification item is confirmed, the audio file that was being reproduced prior to the switch continues to be reproduced.

In other words, as the present embodiment, when one given audio file is being reproduced and the classification item is changed, that audio file continues to be reproduced. Thus, for example, the user is able to continue listening to that musical piece without having to hear it again from the beginning. In short, the reproduction of audio files is more suitable to the user's senses and the usability can be increased.

Furthermore, with the present embodiment, the operating procedure for this [user operation] is extremely simple. In other words, when the operation to switch the classification item is performed with the present embodiment, the group that is under that [newly selected] classification item and that includes the audio file currently being reproduced is selected, and the list image for that group is displayed immediately. In other words, the operation to select a group by mean of the classification item is omitted. Then, when the desired classification item is selected and the confirmation operation is performed, the group within that classification item, which includes the audio file currently being reproduced, is selected as the reproduction target and, as described previously, the audio file currently being reproduced continues to be reproduced. Consequently, after the user has selected a group [and] confirmed a group, for example, it can be said that the operation to then select the same audio file, which was being reproduced prior to changing the classification item, can be omitted.

[0044]

4. Program structure

Next, the technical structure – for the purpose of implementing management of audio file reproduction according to the selection of a classification item, [which was used] as the embodiment explained by means of Figure 2 – will be explained.

First, the structure of a program corresponding to this management of file reproduction that is the present embodiment will be explained with reference to Figure 3. This program is stored as a file reproduction management program in the ROM in memory unit 13 or on HDD 21, for example, and when CPU 11 executes processes according to this program, the audio file reproduction management operations explained with Figure 2 can be obtained.

[0045]

As shown in Figure 3, a modular structure comprised primarily of a user interface module, a reproduction control module, and a track management module is used as the program structure.

The user interface module is a program that controls the user interface and is based on the file reproduction management of the present embodiment; as shown in the figure it has functions as [sic] an input operation-handling process block and a display control process block, for example.

The input operation-handling process block executes required processes corresponding to operation information that is input from a manipulation element [that is used] as operation input unit 15, and from input devices such as a mouse and keyboard. Furthermore, the display control process block executes a display control process such that the required GUI images – for example, the list images for the groups shown in Figure 2 – are displayed on display monitor 17 according to the management of audio file reproduction.

[0046]

The reproduction control module executes reproduction control in order to read audio files from HDD 21 and to then reproduce and output those files; for this purpose, as shown in the figure, it manages current reproduction file information and current list information.

The current reproduction file information is information for the purpose of specifying and recognizing the audio file currently being reproduced; it is formed by storing, for example, the file ID and file name that have been assigned to the audio file currently being reproduced. The details of this information required as the current reproduction file information can be obtained based on information that is added to the audio file.

Furthermore, the current list information is information for the purpose of specifying and recognizing which list (each of these being synonymous with a group) has been set as the current reproduction target. In addition, [the current list information] is formed by storing at least the list ID and list name (the album name, artist name, and the like) that have been assigned to each list and that are managed by the track management module, to be explained next.

[0047]

The track management module is a module that creates and manages list information corresponding to each group created under each classification item.

In other words, as shown within the frame [labeled] as the track management module in Figure 3, the information managed by the track management module is the one or more album lists that are displayed, and that store the management information for each group of [files belonging to] an album that has been created.

As the information pertaining to one album, first, the list ID and the album title corresponding to that album list are stored in one album list. In addition, [the album list] has the audio files that belong to this album and that are linked to prescribed information that is stored in

the audio file as additional information, as well as information for the purpose of enabling the reproduction sequence (track numbers) for these audio files to be identified.

[0048]

In addition, just as with the album lists, one or more artist lists, which store the management information for each group of [files belonging to] an artist that has been created, are displayed. Furthermore, the list information is displayed for one or more genre lists, label lists, and keyword lists, which correspond to the groups [of files] for a genre, label, or keyword that has been created.

Each piece of list information can be created using the additional information for the audio files. In addition, each piece of list information that is created is stored in HDD 21, being stored in the required directory.

Furthermore, this program structure shown in Figure 3 is common to the first and second examples of audio file reproduction management to be explained next. However, with the first and second examples of audio file reproduction management, the data structure for each piece of list information and the content of the additional information stored in the audio files are different; consequently, the processing sequences for the reproduction process differ.

[0049]

5. Management of audio file reproduction (first example)

5-1. Data structure

Next, a first example of audio file reproduction management based on the program structure shown in Figure 3 will be explained.

Figure 4 shows an example of the data structure of an audio file and the list information for the purpose of [implementing] this first example of audio file reproduction management.

[0050]

As shown in Figure 4(a), first, the audio file is comprised of additional information and the audio data. In this case, the structure of the additional information is as shown in Figure 4(b), with a file ID and a file name (the title of the musical piece) being stored therein.

Furthermore, the name of the album having the album list (the group [of files] of an album) to which this audio file belongs is stored therein. Furthermore, the corresponding track numbers in the album list are stored therein as the information indicating the track numbers (reproduction sequence) within this album list.

[0051]

Furthermore, the artist name information for this audio file, as well as the track numbers in the artist list, which indicate the track numbers for the artist list to which this audio file belongs, are stored in this additional information.

Furthermore, the label name information corresponding to this audio file, as well as the track numbers in the label list, which indicate the track numbers for the label list to which this audio file belongs, are stored therein.

Furthermore, the genre name information corresponding to this audio file, as well as the track numbers in the genre list, which indicate the track numbers for the genre list to which this audio file belongs, are stored therein.

Furthermore, the keyword name information corresponding to this audio file, as well as the track numbers in the keyword list, which indicate the track numbers for the keyword list to which this audio file belongs, are stored therein.

[0052]

Furthermore, here it will be assumed that the information "A" is stored as the album name information; information "B," as the artist name information; information "C," as the label name information; "D," as the genre information; and "E" as the keyword name information. This name information can be text data. Furthermore, the name information exemplified here is to facilitate the explanation; in actual practice, name information that is produced by means of multiple characters is stored.

Furthermore, the value of the track number in the album list for this audio file will be represented by (p). Represented similarly,
 the track number in the artist list = q
 the track number in the genre list = r
 the track number in the label list = s
 the track number in the keyword list = t.

[0053]

Furthermore, an example of the structure of an album list will be explained based on the album list belonging to the audio file shown in Figures 4(a) and (b).

As shown in Figure 4(c), information identical to the album name in the additional information of the audio file shown in Figure 4(b) is stored in this album list as album "A." Furthermore, the list ID is stored. This list ID is a unique ID for all list information [sic; for each list].

In addition, track numbers in an amount equal to the number of audio files registered in the current album list are stored as the track information that forms this album list. It can be seen that the audio file shown in Figure 4(a) is managed by this album list as the track for which the track number = p (that is, the p^{th} musical piece).

[0054]

Similarly, Figure 4(d) shows the artist list for the artist group to which the audio file shown in Figures 4(a) and (b) belongs. Information identical to the artist name in the additional information of the audio file shown in Figure 4(b) is stored in this artist list as artist name "B," and the list ID also is stored therein.

Furthermore, track numbers in an amount equal to the number of audio files registered in the current artist list are stored as the track information that forms this list. In this case, the audio file shown in Figure 4(a) is managed by this artist list as the track for which the track number = q .

[0055]

Furthermore, Figure 4(d) [sic; 4(e)] similarly shows the genre list for the genre group to which the audio file shown in Figures 4(a) and (b) belongs. Information identical to the genre name in the additional information of the audio file shown in Figure 4(b) is stored in this genre list as genre name "C," and the list ID also is stored therein.

Track numbers in an amount equal to the number of audio files registered in the current artist [sic; genre] list are stored as the track information that forms this list. In this case, the audio file shown in Figure 4(a) is managed by this artist [sic; genre] list as the track for which the track number = r .

[0056]

Furthermore, the label list and keyword list respectively shown in Figures 4(f) and (g) are the list information for the label and keyword groups to which the audio file shown in Figures 4(a) and (b) belongs, and the information stored therein is in accordance with each of the aforementioned lists.

As for management of the track numbers, the audio file shown in Figure 4(a) is managed by the label list in Figure 4(f) as the track for which the track number = s . Furthermore, [said audio file] is managed by the keyword list in Figure 4(g) as the track for which the track number = t .

[0057]

5-2. Processing operation

Next, an example of the processing operation for the purpose of managing the reproduction of audio files based on the audio file and each piece of list information shown in Figure 4 – [said management of audio files] being the present embodiment – will be explained with reference to the flowcharts in Figure 5-7. Each of the processes shown in these figures accompanies the inter-module communication performed by the required module in the program structure shown in Figure 3.

[0058]

First, the current list information managed by the reproduction control module must be changed in response to a user operation whereby the classification item is changed. Figure 5 shows the process for that purpose.

As shown in Figure 5, with the user interface module, the process in step S11 waits for the operation, as explained with Figure 2, whereby switching of the list image (which corresponds to the group under the classification item) is confirmed. When it is determined that the switching confirmation operation has been performed, the module moves to the process in step S12.

Here, with the user interface module, the switching of the display output of the list image requires that the list information used to display each list image be read from HDD 21, so [this module] has the list ID for each [piece of] list information. In step S12, the list ID for the list information that is the basis for the list image specified by the selection confirmation operation is reported to the reproduction control module.

In addition, whenever the operation to change the list image is performed by, for example, a toggle operation with the user interface module, the list image display is switched as shown in Figure 2, and the display control process for this purpose will be explained later.

[0059]

When the reproduction control module receives the list ID reported by the user interface module based on the process in the aforementioned step S21 [sic; possibly, S12], then in the next step S22, the content of the current list information that [the reproduction module] itself manages is updated so as to correspond to this received list ID.

[0060]

Next, the processing operation for audio file reproduction will be explained with reference to Figure 6. This process is implemented based on inter-module communication between the reproduction control module and the track management module.

Here, it will be assumed that the reproduction control module currently is executing the control process for the purpose of reproducing and outputting a given audio file. In addition, first, in step S31 [the module] waits until the next track reproduction request is obtained. Here, for example the next track reproduction request is obtained when reproduction of the audio file currently being reproduced and output is completed or when a cueing operation for the next track is performed, and the module moves to step S32 and the subsequent processes.

In step S32 the current list information and the current reproduction file information are transmitted to the track management module. Here, for the purpose of confirmation, it will be mentioned that the audio file indicated by the current reproduction file information is not the audio file that should be played next based on the next track reproduction request; rather, it is the audio file that has been reproduced and output until now.

[0061]

When the aforementioned current list information and current reproduction file information are transmitted [sic; received] in step S41, the track control module moves to step S42.

In step S42, the audio file currently being reproduced can be retrieved from HDD 21 by referencing the content of the current reproduction file information that has been received. Then, by means of step S43, the value of the track number in the list corresponding to the received current list information can be read from the additional information of the audio file retrieved in step S42. For example, if the audio file currently being reproduced is the file shown in Figures 4(a) and (b), and the received current list information indicates that it is an album list, then the track number in the album list will be read from the additional information. In the case shown in Figure 4(b), the value "n" of the track number in the current list that has been read is $n = 6$.

[0062]

When the track number in the album list has been read and obtained by the process in step S43, the reproduction control module creates a retrieval condition by means of step S44. Here, the retrieval condition "track number $n+1$ in the list corresponding to the current list information" is created.

Next, in step S45, of the audio files stored in HDD 21, the audio file that has condition "track number n+1 in the list corresponding to the current list information" stored in its additional information is retrieved.

For example, if the audio file shown in Figures 4(a) and (b) is being reproduced and the received current list information identifies the album list for album "A" shown in Figure 4(c), then "the audio file for which the album name information is album "A" and the track number in the album list = p+1" is retrieved in step S45.

[0063]

When the audio file matching the retrieval condition is retrieved by the process in step S45, then in step S46 the track management module reports the file ID for this retrieved audio file to the reproduction control module.

[0064]

When the reproduction control module receives the aforementioned file ID in step S33, it moves to the process in step S34.

In step S34, the audio file having the file ID that has been received is managed as the current reproduction file, and the current reproduction file information is updated. Next, in this case, in step S35 [the reproduction control module] waits for the time at which reproduction of the next track, for which a reproduction request has occurred in step S31, should begin.

Then, in step S35, when it is determined that the time at which reproduction of the next track should begin has arrived, the module moves to step S36. In step S36 [the reproduction control module] identifies the content of the current reproduction file information that it is managing at this time and executes a control process for the purpose of reproducing and outputting the audio data of the audio file indicated by the current reproduction file information.

[0065]

Thus, with the file reproduction management of the present embodiment, the audio file that should be reproduced next in the group (list) that is currently set is always retrieved based on the current list information and the current reproduction file information, [and is retrieved] just prior to the time at which the next track should be reproduced; in addition, [the information for] this retrieved audio file is registered anew in the current reproduction file information. In addition, when reproduction of the next track begins, the audio file indicated by this newly registered reproduction file information is reproduced.

For example, as explained with Figure 2, when a given audio file is being reproduced and the list is changed, the current list information is first changed by means of the process shown in

Figure 5. In addition, by executing the aforementioned process, when a given audio file is being reproduced and the operation to confirm the switching of the list (the group under the classification item) is performed, first, the audio file currently being reproduced continues to be reproduced. In addition, the file that follows the currently reproduced audio file in the reproduction sequence for the changed list (the group under the classification item) is selected as the audio file to be reproduced next.

For example, in accordance with the case shown in Figure 2, after the album list image A1 shown in Figure 2(a) has been switched to the artist list image A2 shown in Figure 2(b), the audio file that is currently being reproduced will be [considered to be] track 13 in the artist list image A2. Accordingly, the next audio file to be reproduced will be track 14 in this artist list.

[0066]

Furthermore, in response to the user's operation to switch the list image, as shown for example in Figure 2, the switched list image is displayed with the file currently being reproduced displayed with emphasis by means of reproduction file specification display A13. The processing operation for this purpose will be explained with reference to Figure 7.

With the process shown in Figure 7, first a judgment is made with the user interface module, by means of step S51, regarding whether the operation to switch the list image (classification item) as explained with Figure 2 has been performed. In this case, a judgment is not made regarding whether an operation to confirm the switching of the list screen exists [sic; has been performed]; rather, a judgment is made regarding whether the switching operation has been performed by the previously described toggle operation.

[0067]

Then, when the judgment is that the aforementioned switching operation has been performed, the module moves to the process in step S52. In Step S52 the list information corresponding to the list image specified [as the image] to change to is read from HDD 21. In this case, the list ID for the list information corresponding to the specified list image can be referenced and the list information can be retrieved and read from HDD 21. Then, the list information that has been read is held in the RAM in memory unit 13.

[0068]

Next, in step S53 the content of the list information held in the RAM is referenced and the audio files corresponding to each [piece of] track information described in this list information are retrieved from HDD 21. In other words, all of the audio files that have the album name, artist name, genre name, or the like possessed by this list and that have a track number in

the list that corresponds to the classification item (album, artist, genre, and the like) corresponding to that [previously referenced] list are retrieved. Then, the file names (titles of the musical pieces) are obtained from the retrieved audio files and are held in the RAM.

Next, in step S54 a request for the current reproduction file information is made with respect to the reproduction control module.

[0069]

When the request for the reproduction file information is received by the process in step S61, the reproduction control module next transmits the current reproduction file information to the user interface module by the process in step S62.

[0070]

The user interface module receives the aforementioned current reproduction file information by the process in step S55. Then, in step S56, it identifies the track number currently being reproduced in the list specified by the user based on the received current reproduction file information.

For this purpose, first the file name of the audio file currently being reproduced is identified from the received current reproduction file information. Then, the match with [one of the] file names obtained and held in the prior step S53 is seen. Then, the track number that corresponds to the matching file name in the list information currently held in the RAM is recognized as the track number currently being reproduced.

[0071]

By means of the processes up to this point, the list information for which a change has been specified, the file name (title of the musical piece) for each track, and the number information for the track currently being reproduced are obtained. Next, in step S57 this information is used to create a list image such as that shown in Figure 2. Then, in step S58, a process to display the created list image on display monitor 17 is executed.

[0072]

6. Management of audio file reproduction (second example)

6-1. Data structure

Next, a second example of audio file reproduction management based on the program structure shown in Figure 3 will be explained.

Figure 8 shows an example of the list information and data structure of an audio file for the purpose of a second example of audio file reproduction management.

In this case the overall structure of the audio file shown in Figure 8(a) is identical to that in Figure 4(a), being comprised of additional information and audio data. Furthermore, the additional information for this example stores at least the file ID and the file name, as shown in Figure 8(b). In other words, as shown in Figure 4(b) the various pieces of title information such as the album name, artist name, and the like, and the information for the track number in the list corresponding to each classification item, which begins with the track number in the album list, do not need to be stored.

[0073]

Here too, Figure 8(c) shows an example of the album list structure for the album list to which the audio file shown in Figures 8(a) and (b) belongs. Furthermore, in this case, the album list stores at least the album title and the list ID information. Accordingly, when the audio file shown in Figures 8(a) and (b) belongs to album A, the album title is described as album "A."

[0074]

Furthermore, as shown in the figure, the structure of the track information is such that the file ID for an audio file is associated with each track number.

Assume that the file ID for the audio file shown in Figures 8(a) and (b) is "xyz." In addition, the file ID "xyz" is stored in the track information for the album list shown in Figure 8(a) in correspondence with track number 6 (TR#6). Accordingly, the audio file shown in Figures 8(a) and (b) is managed in this album list as track number 6 (the sixth musical piece).

[0075]

Similarly, Figures 8(d), (e), (f), and (g) show the list information for the respective artist list, genre list, label list, and keyword list to which the audio file shown in Figures 8(a) and (b) belongs. As can be seen from these figures, the information for each list contains title information indicating the name of the list; that is, artist "B," genre "C," label "D," and keyword "E." Furthermore, the list ID is stored therein.

In addition, the track information within [each list] has a structure such that the file ID for an audio file is associated with a track number.

In this case the audio file shown in Figures 8(a) and (b) is managed as track number 13 in the artist list shown in Figure 8(d).

It is managed as track number 9 in the genre list shown in Figure 8(e).

It is managed as track number 5 in the label list shown in Figure 8(f).

It is managed as track number 7 in the keyword list shown in Figure 8(g).

[0076]

For example, with the structure corresponding to the first example shown in Figure 4, the track number in the list for the group (list) for each classification item to which an audio file belongs was written in that audio file. In other words, the reproduction sequence information for the group (list) for each classification item existed in the audio file. In contrast thereto, with the second example, the track number and the file ID of the audio file are associated in the track information within the list information. In other words, the reproduction sequence information for a group under the classification item corresponding to a list exists in that list information.

[0077]

6-2. Processing operation

Figure 9 shows the processing operation for audio file reproduction management that is executed with respect to the audio file and the information in each list shown in Figure 8. The process shown in this figure is accompanied by communication between the reproduction control module and the track management module.

[0078]

First, with the process in step S101, the reproduction control module waits until the next track reproduction request is obtained. When the next track reproduction request is obtained, the module moves to step S102, and the current list information and current reproduction file information are transmitted to the track management module. In this case too, the current reproduction file information that is transmitted is information indicating the audio file that is currently being reproduced and is before the next track whose reproduction has been requested.

[0079]

At the track management module, the aforementioned current list information and current reproduction file information are received by the process in step S201, and the module moves to step S202 and the subsequent processes.

In step S202 the list information indicated by the current list information that has been received is read from HDD 21. In other words, the list information corresponding to the group under the classification item that is the current reproduction target is obtained. Then, with the process in step S203, the track number associated with the audio file indicated by the received current reproduction file information is identified from the content of the list information that has been read. In other words, the track number of the audio file that is currently being reproduced and is in the list information that is the current reproduction target is identified.

Next, in step S204 the file ID associated with the track number following the track number identified in step S203 is identified from the same list information content.

Next, in step S205 the file ID identified in step S204 as being associated with the next track number is reported to the reproduction control module.

[0080]

At the reproduction control module when the aforementioned file ID is received by the process in step S103, the module moves to step S104.

Next, in step S104 the current reproduction file information is updated so as to register the audio file having the aforementioned received file ID.

[0081]

Next, in step S105 the module waits for the time at which reproduction of the next track, for which a reproduction request has occurred in step S101, should begin, and when it is determined that the time at which reproduction of the next track should begin has arrived, the module moves to step S106.

In step S106 [the reproduction control module] identifies the content of the current reproduction file information that it is managing at this time, and executes the control process for the purpose of reproducing and outputting the audio data of the audio file indicated by the current reproduction file information. Thus, the next audio file is reproduced according to the reproduction sequence specified in the list information that corresponds to the current list information.

[0082]

In addition, with this second example as well, when a given audio file is being reproduced and the operation to change the list is performed, then by executing the aforementioned process, the audio file that is currently being reproduced continues to be reproduced. Furthermore, reproduction of the audio file that in the reproduction sequence in the changed list (the group under the classification item) is next after the audio file that has been reproduced up to this point will be reproduced next.

[0083]

Furthermore, with this second example, the control of the switching of the displayed list image in response to the user's operation to change the list image is [executed] according to the process shown previously in Figure 7; therefore, [only] the points that primarily differ from the previous[ly explained] process will be explained with reference to Figure 7.

In this case the processes shown in step S51 → step S52 are performed in response to the operation to change the list image.

[However,] in this case the process in step S53 differs from that in the first example. In other words, in step S53 the audio files are retrieved from HDD 21 based on each file ID written in the track information in the obtained list information, and the file name for each audio file is obtained and held.

Subsequently, by means of the processes in step S54 → step S55, the current reproduction file information is requested from the reproduction control module and is received, as with the first example.

[0084]

The process in step S56 also differs from that in the first example. As the process in step S56, the file IDs indicated by the received current reproduction file information are compared with the file IDs stored in the track information in the list information being held; thus, it is possible to identify the track number currently being reproduced.

Then, the processes in the subsequent steps S57 → step S58 are identical to those in the first example.

[0085]

7. Management of audio file reproduction (third example)

The processes for the purpose of audio file reproduction management [explained] as the first and second examples assume that the [management] program has the collective structure shown in Figure 3, with communication occurring between these modules.

However, the present embodiment can be implemented not only with a program based on a collective modular structure of this type; it can be implemented with programs that are structured differently.

Therefore, the third example is a case wherein the audio file reproduction management of the present embodiment is implemented with a single process for the program, rather than with a program based on a collective modular structure.

[0086]

The flowchart in Figure 10 shows the processing operation for the purpose of performing the audio file reproduction management corresponding to this third example. The process shown in this figure is executed by CPU 11 according to the program that constitutes this third example.

Furthermore, in this case the current reproduction file information and current list information shown in Figure 3, as well as the information for each list and audio file, are

managed collectively by the program that is example 3. Furthermore, the program that is example 3 executes the program functions of the input operation-handling process block and the display control process block [that operate] as the user interface module. In other words, the third example is a program wherein the program functions of the user interface module, reproduction control module, and track management module shown in Figure 3 have been integrated.

Furthermore, in this case either the structure shown in Figure 4 as the first example or the structure shown in Figure 8 as the second example can be used as the data structure for the audio files and the information in each list, but the example here will be explained using the structure shown as the first example in Figure 4.

[0087]

First, in step S301 in Figure 10, [the program] waits for the next track reproduction request to be obtained, and then moves to the process in step S302 when the next track reproduction request is obtained.

[0088]

In step S302 the list information indicated by the current list information being held [in RAM] is read from HDD 21.

Next, the processes in step S303 – step S305 are identical to the processes in step S43 – step S45 executed by the track management module in Figure 6, so their explanation will be omitted.

Then, if an audio file is retrieved by the process in step S305, then the file ID for this retrieved audio file is held in RAM by the process in step S306.

[0089]

Then, in step S307 [the program] waits for the time at which reproduction of the next track begins, and when the time at which reproduction of the next track should begin arrives, the audio file having the file ID held in the previous step S306 is read from HDD 21 by the process in step S308, and the reproduction and output of that audio file begins.

[0090]

Furthermore, as discussed previously, the program for the purpose of implementing the aforementioned various processes is recorded in advance and stored in the ROM in memory unit 13 of recording/reproduction device 1; or, in this case it can be stored in HDD 21.

Alternatively, the program can be temporarily or permanently stored (recorded) on a removable recording medium such as a flexible disk, a CD-ROM (Compact Disc Read Only

Memory), MO (Magneto-Optical) disk, DVD (Digital Versatile Disc), magnetic disk, or semiconductor memory. A removable recording medium of this type can be offered as so-called "packaged software." For example, with the present embodiment, the program can be recorded on a CD-ROM and offered as packaged software. Thus, the program can be installed by reading [the program] with CD drive 19 in recording/reproduction device 1 and storing it in the ROM in memory unit 13.

In addition to installing the program from a removable recording medium of the aforementioned type, the program can be downloaded via a network such as a LAN (Local Area Network) or the internet from a server or the like in which it is stored.

[0091]

Furthermore, the present invention is not limited to the previously explained embodiment; various modifications are possible. For example, the module structure of the program shown in Figure 3, the data structures shown in Figure 4 and Figure 5 [sic; 8], the various processing operations shown in Figure 5-Figure 10, and the basic management structure of the audio file shown in Figure 11 are merely examples, and in actual practice they can be appropriately changed.

[0092]

Effect of the invention

As explained above, based on reproduction sequence information (list information), the present invention manages the reproduction sequence for multiple units of information (audio files) stored on a recording medium (HDD). This reproduction sequence information corresponds to each of multiple classification items.

In addition, when information is being output according to the reproduction sequence indicated by the aforementioned reproduction sequence information on the basis of the aforementioned units of information, and when the classification item setting is changed (switched) in response to a user operation, for example, the aforementioned unit of information that is the basis for the information being output by an information output means at this time is maintained.

In other words, when a unit of information is being reproduced and output, for example, or when the display and output of a type of list information (a list image) that includes one specific unit of information is occurring, the reproduction and output of the aforementioned unit of information continues even if the classification item is changed. Furthermore, even when the list information being displayed is changed in response to a change in the classification item, the

forementioned one specific unit of information is always included and displayed as a meaningful piece of information.

[0093]

Thus, as the present invention, even if the user performs an operation to change the classification item, the information being output at that time is not changed, nor does the output stop; the output is able to continue. In other words, with the present invention, information can be output in a manner suitable to the user's senses, and to that extent the sensation of use of the device as an information output device is improved.

Furthermore, the prior art is bothersome in that after the classification item is changed and an attempt is made to output the same information as the information prior to the change, a considerable operating procedure must be included. In contrast thereto, with the present invention the information being output prior to the change continues to be output when the operation to change the classification item is performed, so [additional] operations by means of the conventional procedure are unnecessary; thus, the operability is improved, and in this respect also the aforementioned improvement in the sensation of use is promoted.

Brief description of the figures

Figure 1 is a block diagram showing a structural example of a recording/reproduction device as an embodiment of the present invention.

Figure 2 is an explanatory diagram showing an example of changes in the display state of list images in response to a classification item switching operation with the present embodiment.

Figure 3 is a schematic diagram showing a structural example of a program as the present embodiment.

Figure 4 is a schematic diagram showing an example of the data structure corresponding to a first example of audio file reproduction management.

Figure 5 is a flowchart showing the processing operation for the purpose of updating the current list information in response to an operation to change the classification item in the first example of audio file reproduction management.

Figure 6 is a flowchart showing the processing operation for audio file reproduction in the first example of audio file reproduction management.

Figure 7 is a flowchart showing the display control process for the list image in response to an operation to change the classification item.

Figure 8 is a schematic diagram showing an example of the data structure corresponding to a second example of audio file reproduction management.

Figure 9 is a flowchart showing the processing operation for audio file reproduction in the second example of audio file reproduction management.

Figure 10 is a flowchart showing the processing operation for audio file reproduction in a third example of audio file reproduction management.

Figure 11 is a schematic diagram showing an example of the basic form of management for audio files in the present embodiment.

Explanation of symbols

- 1 Recording/reproduction device
- 11 CPU
- 13 Memory unit
- 14 [sic; 15] Operation input unit
- 15 [sic; 14] Input processing unit
- 16 Display processing unit
- 17 Display monitor
- 18 CD drive control unit
- 19 CD drive
- 21 HDD
- 22 Communications processing unit
- 23 Network interface
- 24 Audio data processing unit
- 25 Speaker
- 26 Antenna
- 27 Tuner

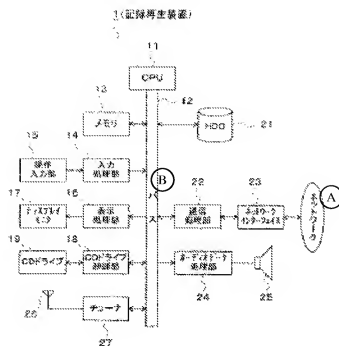


Figure 1

- Key:
- A Network
 - B Bus
 - 1 Recording/reproduction device
 - 13 Memory
 - 14 Input processing unit
 - 15 Operation input unit
 - 16 Display processing unit
 - 17 Display monitor
 - 18 CD drive control unit
 - 19 CD drive
 - 22 Communications processing unit
 - 23 Network interface
 - 24 Audio data processing unit
 - 27 Tuner

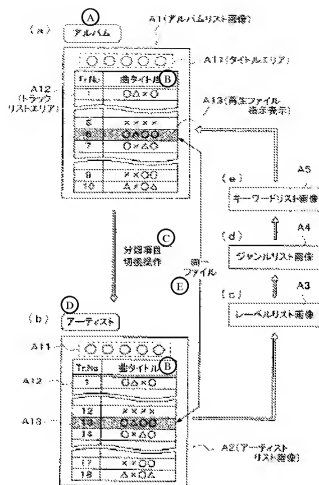


Figure 2

- Key:
- A Album
 - B Music title
 - C Classification item switching operation
 - D Artist
 - E Same file
 - A1 Album list image
 - A2 Artist list image
 - A3 Label list image
 - A4 Genre list image
 - A5 Keyword list image
 - A11 Title area
 - A13 Reproduction file specification display

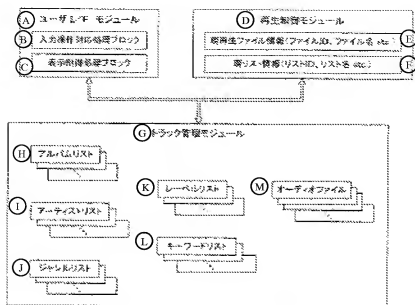


Figure 3

- Key:
- A User I/F module
 - B Input operation-handling process block
 - C Display control process block
 - D Reproduction control module
 - E Current reproduction file information (file ID, file name, etc.)
 - F Current list information (list ID, list name, etc.)
 - G Track control module
 - H Album list
 - I Artist list
 - J Genre list
 - K Label list
 - L Keyword list
 - M Audio files

- S2 Track numbers in artist list
 S3 Track numbers in label list
 S4 Track numbers in genre list
 S5 Track numbers in keyword list

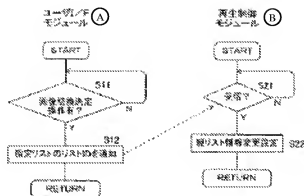


Figure 5

- Key: A User I/F module
 B Reproduction control module
 S11 Operation to confirm image-switching?
 S12 Report list ID for specified list
 S21 Received?
 S22 Setting of changes to current list information

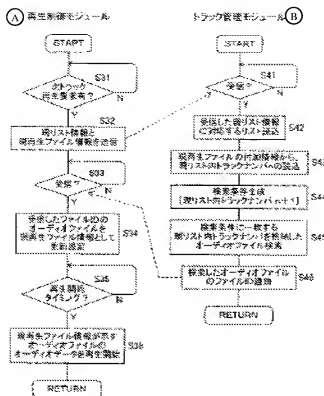


Figure 6

- Key: A Reproduction control module
 B Track management module
- S31 Next track reproduction request exists?
 S32 Transmit current list information and current reproduction file information
 S33 Received?
 S34 Update setting for current reproduction file information to audio file having received file ID
 S35 Time to begin reproduction?
 S36 Begin reproducing audio data of audio file indicated by current reproduction file information
- S41 Received?
 S42 Read list corresponding to received current list information
 S43 Read track number "n" in current list from additional information for current reproduction file
 S44 Generate retrieval condition "track number n+1 in current list"
 S45 Retrieve audio file that stores the track number in the current list matching the retrieval condition
 S46 Report file ID for retrieved audio file

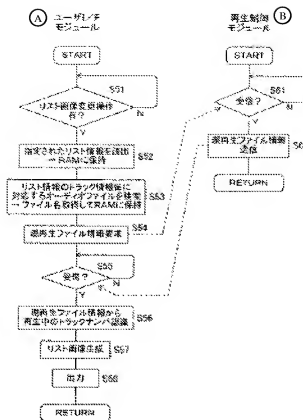


Figure 7

- Key: A User I/F module
 B Reproduction control module
 S51 List image change operation [performed?]
 S52 Read specified list information,
 → Hold in RAM
 S53 Retrieve corresponding audio file for each piece of track information in list
 information
 → Obtain file name and hold in RAM
 S54 Request current reproduction file information
 S55 Received?
 S56 From current reproduction file information, identify track number currently being
 reproduced
 S57 Generate list image
 S58 Output
 S61 Received?
 S62 Transmit current reproduction file information

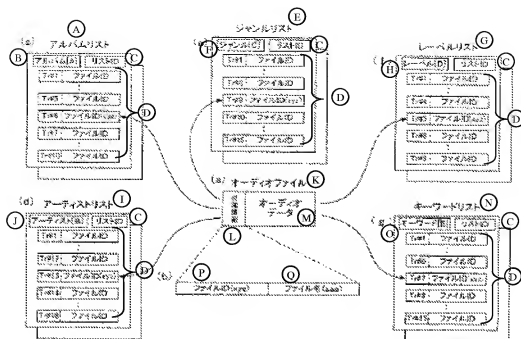


Figure 8

Key:

A	Album list
B	Album (A)
C	List ID
D	File ID
E	Genre list
F	Genre (C)
G	Label list
H	Label (D)
I	Artist list
J	Artist (B)
K	Audio file
L	Additional information
M	Audio data
N	Keyword list
O	Keyword (E)
P	File ID
Q	File name

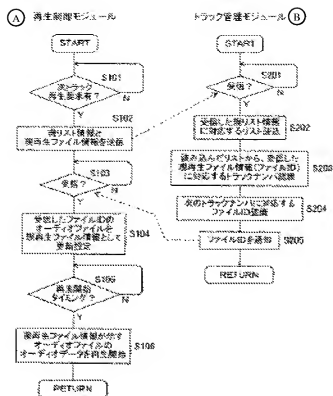


Figure 9

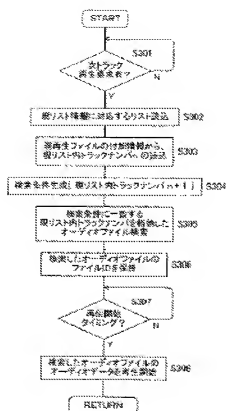


Figure 10

- Key:
- S301 Next track reproduction request exists?
 - S302 Read list corresponding to current list information
 - S303 Read track number "n" in current list from additional information for current reproduction file
 - S304 Generate retrieval condition "track number n+1 in current list"
 - S305 Retrieve audio file that stores the track number in the current list matching the retrieval condition
 - S306 Hold file ID of retrieved audio file
 - S307 Time to begin reproduction?
 - S308 Begin reproducing audio data of retrieved audio file

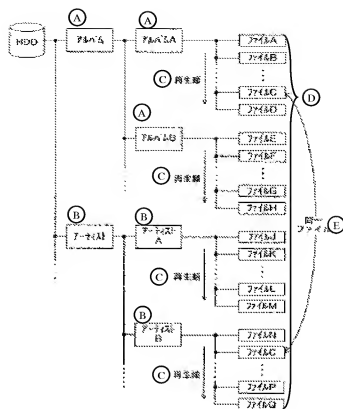


Figure 11

Key: A Album ____
 B Artist ____
 C Reproduction sequence
 D File ____
 E Same file